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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WANG, GEORGE Y	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 10/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/786,699	ACKLIN ET AL.	
	Examiner	Art Unit	
	George Y. Wang	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☒ Claim(s) *21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 21 is objected to as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The identity of a substrate that is a "stamped part" is unclear.

(Note: For the purpose of examination, Examiner assumes that "stamped part" means anything that has markings.)

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-4, 9-11, 14-20, and 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Broom (U.S. Patent No. 5,516,727) in view of Tanaka et al. (U.S. Patent No. 5,218,611, from hereinafter "Tanaka '611"), and in further view of Thillays et al. (U.S. Patent No. 4,387,385, from hereinafter "Thillays").

4. Regarding claims 1-2 and 14, Broom discloses an arrangement comprising a light-emitting power semiconductor device (fig. 4, ref. 40) disposed on a substrate structure (fig. 4, ref. 43) and having a plastic protective body (fig. 4b, ref. 45) formed onto the substrate structure, leaving the light exit region of the semiconductor exposed to be coupled to an optical waveguide (fig. 4b, ref. 42) and out of the plastic protective body.

However, Broom fails to specifically disclose a plastic protective body made from opaque plastic of either thermoplast of duroplast and characterized with filler particles for thermal conductivity, a metallic substrate, and a transparent plastic material and filler particles dispersed in the plastic protective body.

Thillays discloses a semiconductor light-emissive diode apparatus having a metallic substrate (col. 1, lines 22-29) and using an opaque thermoplast characterized with filler particles for thermal conductivity (col. 4, lines 8-14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a metallic substrate since one would be motivated to provide adequate conductive connection to the metal plates, pins, and wires (col. 1,

lines 8-14). Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a plastic protective body made from opaque thermoplast characterized with glass filler particles for thermal conductivity since one would be motivated not only to fill the interstitial space to ensure mechanical coherence and protection (col. 1, lines 13-18), but also to provide reflectivity on its surface. Although the thermoplast itself is opaque, the reflective properties which are at least equal to those of silver-plated or gold-plated surfaces has the advantage of minimizing optical interference between adjacent light conductors (col. 2, lines 22-32). In addition, a transparent plastic material filling the space between light-emitting power semiconductor device and the optical waveguide since one would be motivated to reduce loss between optical transmission of the semiconductor device and the waveguide (col. 2, lines 44-56). Furthermore, such a material filling minimizes dew and dust formation, ultimately enhancing laser light guiding performance (col. 2, lines 44-56).

5. As to claims 3-4 and 20, Broom and Tanaka '611 disclose the system arrangement as recited above with a plastic protective body. However, the references fail to specifically disclose a plastic protective body made from opaque plastic of either thermoplast of duroplast and characterized with filler particles for thermal conductivity.

Thillays discloses a semiconductor light-emissive diode apparatus using an opaque thermoplast characterized with filler particles for thermal conductivity (col. 4, lines 8-14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a plastic protective body made from opaque thermoplast characterized with glass filler particles for thermal conductivity since one would be motivated not only to fill the interstitial space to ensure mechanical coherence and protection (col. 1, lines 13-18), but also to provide reflectivity on its surface. Although the thermoplast itself is opaque, the reflective properties which are at least equal to those of silver-plated or gold-plated surfaces has the advantage of minimizing optical interference between adjacent light conductors (col. 2, lines 22-32).

6. Regarding claims 9-11, 19, and 24, Broom and Tanaka '611 disclose an arrangement and method as recited above. The references, however, do not specifically disclose an optical waveguide having an SiO_2 coating, structured as a plurality of individual optical waveguides, and having an input and output cross-sectional area that is different in size and geometric orientation.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have an optical waveguide having an SiO_2 coating since one would be motivated by its reflective properties. As for a waveguide made up of a plurality of individual optical waveguides, one of ordinary skill in the art would recognize this construct as well known in the art for providing variability and flexibility in optical transmission. Furthermore, having an input and output cross-sectional area that is different in size and geometric orientation can be defined routinely when waveguides

are trimmed at a slant angle and polished. This not only enhances coupling efficiency, but is recognized by one of ordinary skill in the art in semiconductor laser devices.

7. As per claim 15, Broom discloses an arrangement as recited above where the light-emitting power semiconductor device is a semiconductor laser (abstract).

8. Regarding claims 16-18, Broom discloses a method of fabricating an arrangement as recited above where the light-emitting power semiconductor is placed against and electrically contacted by a substrate structure (fig. 4a), an optical waveguide is affixed to the substrate (fig. 4a), the protective plastic body is injection-coated (fig. 4c).

However, the reference fails to specifically disclose a light exit surface being exposed in the region of the outer periphery of the plastic protective body by breaking off a piece of the hardened protective body.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to expose the light exiting surface of the waveguide by breaking off the harden plastic body since one would be motivated to provide optical data transmission and to ensure efficient optical coupling.

9. Claims 5 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broom in view of Tanaka '611 and Thillays, and in further view of Tanaka et al. (U.S. Patent No. 5,307,362, from hereinafter "Tanaka '362").

Broom, Tanaka '611, and Thillays disclose the system arrangement as recited above with a substrate structure. However, the references fail to specifically disclose a substrate structure that is singulated made of panel-shaped or a strip-shaped metal sheet.

Tanaka '362 discloses a semiconductor laser device with a substrate support that is singulated and made of a panel-shaped metal sheet (fig. 4, ref. 15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a substrate support that is singulated and made of a panel-shaped metal sheet since one would be motivated to enhance beam performance. Having a substrate as described above facilitates adjustment and positioning of the laser device components to an improved orientation that optimizes laser beam performance of the laser chip while also equalizing the product quality (col. 2, lines 13-23).

10. Claims 6-8 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broom in view of Tanaka '611 and Thillays, and in further view of Benett et al. (U.S. Patent No. 5,548,605, from hereinafter "Benett").

Broom, Tanaka '611, and Thillays disclose the system arrangement as recited above with a substrate structure.

However, the references fail to specifically disclose a substrate structure that is in thermal contact with a coolant that flows around or across at least a portion of its surface. Furthermore, the references do not specifically teach a substrate having a heat

exchange body with microchannels or microplates that is disposed in the vicinity of the power semiconductor device and on the side of the substrate structure facing away from the semiconductor device.

Benett discloses a laser diode device having a substrate structure (fig. 2a, ref. 16) that is in thermal contact with a water coolant (fig. 2a, ref. 14) that flows around or across at least a portion of its surface (fig. 2a, ref. 10). Benett further teaches the substrate having a heat exchange body with microchannels (fig. 2a, ref. 10) and is disposed in the vicinity of the power semiconductor device on the side of the substrate structure facing away from the semiconductor device (fig. 2a).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included a substrate structure having a heat exchange body with microchannels for water coolant flow and is disposed in the vicinity of the power semiconductor device on the side of the substrate structure facing away from the semiconductor device since one would be motivated to reduce thermal dissipation around the laser diode (col. 2, lines 24-25). While it is important to cool the laser diode to an acceptable level, one would further be motivated by above described structure to do so without providing a high average output of power and without diminishing laser power (col. 3, lines 7-20).

11. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broom in view of Tanaka '611 and Thillays, and in further view of Po et al. (U.S. Patent No. 5,268,978, from hereinafter "Po").

Broom and Tanaka disclose the system arrangement as recited above with a transparent plastic material filling the space between light-emitting power semiconductor device and the optical waveguide.

However, the references fail to specifically disclose a cylindrical lens between light-emitting device and the optical waveguide.

Po discloses an optical fiber laser having a cylindrical lens between a light-emitting device and anoptical waveguide (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a cylindrical lens since one would be motivated to enhance the reduction of loss between optical transmission of the semiconductor device and the waveguide resulting from the transparent filling by providing increased efficiency in optical coupling (col. 3, lines 39-47), which ultimately enhancing laser light guiding performance.

12. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Broom in view of Tanaka '611, Thillays, and Benett, and in further view of Tanaka et al. (U.S. Patent No. 5,307,362, from hereinafter "Tanaka '362").

Broom et al. disclose the system arrangement as recited above, however, the references fail to specifically disclose a substrate made of a lead frame.

Tanaka '362 discloses a semiconductor laser device with a substrate made of a lead frame (fig. 4, ref. 15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a metallic lead frame since one would be motivated to improve laser beam emission performance of the laser chip while also equalizing the product quality (col. 2, lines 13-23).

13. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Broom in view of Tanaka '611 and Thillays, and in further view of Karpinski (U.S. Patent No. 5,311,535).

Broom and Tanaka disclose the system as recited above, however, the references fail to specifically disclose a semi conductor device that is a laser bar.

Karpinski discloses an optical fiber laser that has a semiconductor laser bar (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a semiconductor laser bar since one would be motivated to emit light in a controlled direction (abstract), relative to the part of the device. This not only provides control, but reliability and accuracy.

Response to Arguments

14. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's main argument is targeted at the motivation for the combinability of the Broom and Thillays references. Applicant admits that, "the only way one can base a

motivation to use the reflectivity teaching in Thillays to combine with Broom and Tanaka is if one retains Broom's essential teaching of an air gap and perhaps somehow wants to provide a reflectivity around the light conductors of the air gap." However, Applicant argues that while this may provide a reason to use a filler in Broom, it would not result in the invention as claimed since it would involve air gap light conductors provided by apertures. In support of this contention, Applicant goes to great length to describe how the Broom reference must include an air gap, the Tanaka reference does not have a space between the solid state waveguide, and the Thillays having to reason for filler particles. Examiner disagrees.

It is noted that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, no anticipation of the subject matter is required, as long as there is some teaching, suggestion, or motivation to combine. Clearly, the Thillays reference provides that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a plastic protective body made from opaque thermoplast characterized with glass filler particles for thermal conductivity since one would be motivated not only to fill the interstitial space to ensure mechanical coherence and protection (col. 1, lines 13-18), but also to provide reflectivity on its surface. Although the thermoplast itself is opaque, the reflective

properties which are at least equal to those of silver-plated or gold-plated surfaces has the advantage of minimizing optical interference between adjacent light conductors (col. 2, lines 22-32). In addition, a transparent plastic material filling the space between light-emitting power semiconductor device and the optical waveguide since one would be motivated to reduce loss between optical transmission of the semiconductor device and the waveguide (col. 2, lines 44-56). Furthermore, such a material filling minimizes dew and dust formation, ultimately enhancing laser light guiding performance (col. 2, lines 44-56). While Applicant persists to argue that it does "not make sense" to fill the interstitial space with filler, Examiner asserts that the references suggest more than adequate motivation to do so. Moreover, there is no language or recitation in the claim invention that suggests that an air gap does not exist. As a result, it would certainly be possible to combine the teachings of the references to form the invention of claim 1.

Applicant also argues that the third and fourth steps of the method of Claim 16 are not disclosed in Broom. Examiner disagrees. Applicant agrees that the Fig. 4c clearly discloses the "encapsulant is flowed over laser and fiber" (col. 4, lines 29-30). But when Applicant argues "presumably" that the encapsulant ends at the base, he is asserting that this does not fit the language of the claims "completely shrouding." Examiner disagrees because nowhere in the claims does it talk about covering the ends or bases of the fibers. Furthermore, even if this is assumed, by permitting the ends to go uncovered, the fourth step to expose a light exit surface is met. As a result, Broom clearly teaches the limitations of the invention of claim 16.

Therefore, Examiner holds to the validity of the references used and maintains rejection.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Y. Wang whose telephone number is 571-272-2304. The examiner can normally be reached on M-F, 8 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gw
October 7, 2004

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